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WHAT IS CLAIMED IS

1. A high-strength carburized part comprising:

a core having a chemical composition of

C: 0.15 to 0.30% by weight,

Si: 0.25 to 1.10% by weight,

Mn: 0.3 to 1.20% by weight,

Cr: 1.25 to 2.0% by weight and

a balance including unavoidable impurities and Fe;

a vacuum-carburized surface having a carbon ratio ranging from 1.0 to 1.5%;

a region extending from the surface to a depth of 50  $\mu\text{m}$  and having a grain boundary oxide layer with a depth of 1  $\mu\text{m}$  or less, wherein a area ratio of carbides of said surface is from 5 to 15% and at least 90% of carbides have a grain size of 5  $\mu\text{m}$  or less , and

wherein the core comprises an interior region which cannot be carburized.

2. The high-strength carburized part as set forth in Claim 1, wherein the core further comprises B and Ti in an amount of from 0.0005 to 0.0050% by weight and from 0.02 to 0.06% by weight, respectively.

3. The high-strength carburized part as set forth in Claim 1, wherein the core further comprises Nb in an amount of from

0.02 to 0.12% by weight.

4. The high-strength carburized part as set forth in Claim 2, wherein the core further comprises Nb in an amount of from 0.02 to 0.12% by weight.

5. The high-strength carburized part as set forth in Claim 1, wherein the core further comprises at least one of: Pb ranging from 0.01 to 0.20% by weight, Bi ranging from 0.01 to 0.10% by weight, Ca ranging from 0.0005 to 0.0050% by weight and S ranging from 0.005 to 0.100% by weight.

6. The high-strength carburized part as set forth in Claim 2, wherein the core further comprises at least one of: Pb ranging from 0.01 to 0.20% by weight, Bi ranging from 0.01 to 0.10% by weight, Ca ranging from 0.0005 to 0.0050% by weight and S ranging from 0.005 to 0.100% by weight.

7. The high-strength carburized part as set forth in Claim 3, wherein the core further comprises at least one of: Pb ranging from 0.01 to 0.20% by weight, Bi ranging from 0.01 to 0.10% by weight, Ca ranging from 0.0005 to 0.0050% by weight and S ranging from 0.005 to 0.100% by weight.

8. The high-strength carburized part as set forth in Claim

4, wherein the core further comprises at least one of: Pb ranging from 0.01 to 0.20% by weight, Bi ranging from 0.01 to 0.10% by weight, Ca ranging from 0.0005 to 0.0050% by weight and S ranging from 0.005 to 0.100% by weight.

9. The high-strength carburized part as set forth in Claim 1, wherein the chemical composition of Si is 0.60% by weight or less.

10. The high-strength carburized part as set forth in Claim 1, wherein the chemical composition of Mn is 0.60% by weight or less.

11. The high-strength carburized part as set forth in Claim 1, wherein the core further includes at least one of: Cu in an amount of 0.30% by weight or less, Ni in an amount of 0.30% by weight or less and Mo in an amount of 0.05% by weight or less.

12. The high-strength carburized part as set forth in Claim 1, wherein the core further comprises at least one of the following:

B and Ti in an amount of from 0.0005 to 0.0050% by weight and from 0.02 to 0.06% by weight, respectively; and

Nb in an amount of from 0.02 to 0.12% by weight; and  
Pb ranging from 0.01 to 0.20% by weight, Bi ranging from  
0.01 to 0.10% by weight, Ca ranging from 0.0005 to 0.0050% by  
weight and S ranging from 0.005 to 0.100% by weight, wherein  
at least one of the following is true:

the chemical composition of Si is 0.60% by weight  
or less,

the chemical composition of Mn is 0.60% by weight or less  
or

Cu in an amount of 0.30% by weight or less, Ni in an amount  
of 0.30% by weight or less and Mo in an amount of 0.05% by weight  
or less.

13. A method of manufacturing a carburized part, comprising  
steps of:

working an alloy that includes 0.15 to 0.30% C by weight,  
0.25 to 1.10% Si by weight, 0.3 to 1.20% Mn by weight, 1.25  
to 2.0% Cr by weight and a remaining balance including  
unavoidable impurities and Fe into a shape of the carburized  
part;

vacuum-carburizing said alloy such that a C content on  
a surface of said alloy is from 1.0 to 1.5%.

14. The method of claim 13, wherein in a region extending  
from a surface of the carburized part to a depth of 50  $\mu$ m,

an area ratio of carbides is ranging 5 to 15%, and at least 90% of carbides have a grain size of 5  $\mu\text{m}$  or less and a grain boundary oxide layer with a depth of 1  $\mu\text{m}$  or less.

15. The method of claim 13, wherein said alloy further comprises B and Ti in an amount of from 0.0005 to 0.0050% by weight and from 0.02 to 0.06% by weight, respectively.

16. The method of claim 13, wherein said alloy further comprises Nb in an amount of from 0.02 to 0.12% by weight.

17. The method of claim 15, wherein said alloy further comprises Nb in an amount of from 0.02 to 0.12% by weight.

18. The method of claim 13, wherein said alloy further comprises at least one of: Pb ranging from 0.01 to 0.20% by weight, Bi ranging from 0.01 to 0.10% by weight, Ca ranging from 0.0005 to 0.0050% by weight and S ranging from 0.005 to 0.100% by weight.

19. The method of claim 15, wherein said alloy further comprising at least one of:

Pb ranging from 0.01 to 0.20% by weight;

Bi ranging from 0.01 to 0.10% by weight;

Ca ranging from 0.0005 to 0.0050% by weight or

S ranging from 0.005 to 0.100% by weight.

20. The method of claim 16, wherein said alloy further comprising at least one of:

Pb ranging from 0.01 to 0.20% by weight;

Bi ranging from 0.01 to 0.10% by weight;

Ca ranging from 0.0005 to 0.0050% by weight or

S ranging from 0.005 to 0.100% by weight.

21. The method of claim 17, wherein said alloy further comprising at least one of:

Pb ranging from 0.01 to 0.20% by weight;

Bi ranging from 0.01 to 0.10% by weight;

Ca ranging from 0.0005 to 0.0050% by weight or

S ranging from 0.005 to 0.100% by weight.

22. The method of claim 13, wherein said alloy meets at least one of the following conditions: the chemical composition of Si is 0.60% by weight or less; and the chemical composition of Mn is 0.60% by weight or less; Cu is in an amount of 0.30% by weight or less, Ni is in an amount of 0.30% by weight or less and Mo is in an amount of 0.05% by weight or less.

23. A gear for use in a power transmission, said gear being made of a material comprising:

a core having a chemical composition of

C: 0.15 to 0.30% by weight,

Si: 0.25 to 1.10% by weight,

Mn: 0.3 to 1.20% by weight,

Cr: 1.25 to 2.0% by weight and

a balance including unavoidable impurities and Fe;

a vacuum-carburized surface having a carbon ratio ranging from 1.0 to 1.5%;

a region extending from the surface to a depth of 50  $\mu\text{m}$  and having a grain boundary oxide layer with a depth of 1  $\mu\text{m}$  or less, wherein a area ratio of carbides of said surface is from 5 to 15% and at least 90% of carbides have a grain size of 5  $\mu\text{m}$  or less, and

wherein the core comprises an interior region which cannot be carburized.